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PATENT SPECIFICATION

NO DRAWINGS

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COMPLETE SPECIFICATION

Improvements relating to the Testing of Water for pH

I, ARTHUR THOMAS PALIN, "Brentwood," 2 Main Road, Kenton Bank Foot, Newcastle upon Tyne, 3, British subject, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

In connection with the treatment of water for instance at swimming pools and waterworks it is desirable to know the pH value of the water. In measuring these pH values use is made of the fact that certain dyes known as indicators change their colour in definite and reproducible manner and degree according to the pH value of the solution with which they are mixed. Thus the addition of an appropriate indicator to the sample of the water being tested results in the development of a colour which, by matching against the colours of buffer solutions of known pH which contain an equal concentration of the same indicator, permits of the pH value of the water being determined except in the case of distilled water and waters of low buffer capacity to which colorimetric methods of determining pH are not normally applicable. In some circumstances it may be more convenient to compare the colour of the mixture of indicator and water with permanent coloured glasses which have been standardized against buffer solutions containing indicator.

In the preparation of indicator solutions it is the standard practice to adjust the pH of the solution by the addition of an acid or an alkali to a value corresponding approximately to the mid-point of the pH range for the particular indicator concerned, so that the pH of the indicator solution does not then appreciably affect the result obtained for the water being tested.

In such colorimetric procedures interference is caused by the presence of oxidizing agents such as free chlorine in the water being tested, because the indicator becomes bleached or its colour is modified in some way. Comparison with the colour standards may then give results which are subject to significant error, or the differences in hue between the colours being matched may be so pronounced as to make the comparison difficult or impossible.

A method previously used to overcome this interference consists in adding either before or with the indicator a quantity of a substance such as sodium thiosulphate able to reduce or neutralize the free chlorine or other oxidizing agent so that it may be destroyed before the indicator is affected. Such a procedure is not entirely satisfactory because there remains the possibility that the reducing or neutralizing substance added may influence the pH of the water to an undesirable extent so that the pH value obtained may not reliably represent the pH value of the original water sample.

I have found that this defect may be entirely or largely overcome by adding to the sodium thiosulphate or other reducing or neutralizing agent a quantity of an acid or alkali sufficient to adjust the pH of the solution of said agent to the same value as that of the indicator solution with which it is to be used. When so modified an amount of the reducing or neutralizing agent sufficient to destroy such amounts of free chlorine or other oxidizing agent as are normally encountered in water treatment may be added without significantly affecting the accuracy of the pH test except in the cases aforementioned where colorimetric procedures are not applicable.

In conformity with this discovery my invention may be said to reside in a colorimetric method of testing the pH of water containing free chlorine, free bromine, free chlorine dioxide or other oxidizing agent, the method comprising the addition of water, before or with the pH indicator or indicator mixture, of a reducing agent such as sodium thiosulphate to which has been added an acid such as hydrochloric acid or an alkali such as sodium hydroxide sufficient to adjust the pH of the solution of the reducing agent approximately to that of the mid-point of the pH range of the particular indicator or mixture of indicators concerned so that the application of the

reducing agent in the required amount enables the pH value to be determined by colorimetric means without significant interference from any free chlorine or other oxidizing agent originally present in the water.

Among the indicators which may be used are cresol red, cresol purple, thymol blue, bromo phenol blue, bromo cresol green, methyl red, chloro phenol red, bromo cresol purple, bromo thymol blue, phenol red or diphenol purple.

The reducing agent may consist of or include a thiosulphate, for example sodium thiosulphate, or an arsenite, for example sodium arsenite or a sulphite, for example sodium sulphite.

Instead of using the indicator or indicators and the reducing agent in the form of separate solutions of known strength it may be advantageous to combine them together as mixtures in solution, powder or tablet form.

EXAMPLE.

A suitable mixture for the determination of the pH of a chlorinated water using phenol red as indicator may be prepared as follows:—

Moisten 0.1 gram of phenol red with about 2 ml. of ethyl alcohol in a glass mortar, rub up with 5.7 ml. of 0.05 N sodium hydroxide solution and dilute with distilled water to 25 ml. To this indicator solution add 200 ml. of 0.5% sodium thiosulphate solution and make up with distilled water to a volume of 250 ml. Finally adjust the pH to approximately the mid-point of the range 6.8 to 8.4 by the addition of 0.02 N acid or alkali.

WHAT I CLAIM IS:—

1. A method for testing the pH of water containing an oxidizing agent for example free chlorine, free bromine or free chlorine dioxide, comprising the addition of a reducing agent to the water before or with the pH indicator, to which reducing agent has been added an acid or an alkali sufficient to adjust the pH of its solution to a value corresponding approximately to the mid-point of the pH range of the particular indicator concerned, the amount of said reducing agent added to the water being sufficient to overcome any interference caused by the oxidizing agent bleaching or modifying in some way the colour produced by the indicator.

2. A method according to Claim 1 wherein the indicator consists of or includes cresol red, cresol purple, thymol blue, bromo phenol blue, bromo cresol green, methyl red, chloro phenol red, bromo cresol purple, bromo thymol blue, phenol red or diphenol purple.

3. A method according to Claim 1 wherein the reducing agent consists of or includes a thiosulphate, for example sodium thiosulphate, an arsenite, for example sodium arsenite or a sulphite, for example sodium sulphite.

4. A method as claimed in any of Claims 1 to 3 wherein the indicator and the reducing agent are mixed together and added in solution, powder or tablet form.

5. The method for the testing of the pH value of water containing oxidizing agents substantially as hereinbefore described.

A. T. PALIN.

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